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Are psychogenic non-epileptic seizures just another symptom of conversion disorder?

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## ABSTRACT

Psychogenic non-epileptic seizures (PNES) are classified with other functional neurological symptoms as “Conversion Disorder”, but there are reasons to wonder whether this symptomatology constitutes a distinct entity. We reviewed the literature comparing PNES with other functional neurological symptoms, finding eight studies that directly examined this question. Though all but one found significant differences - notably in presenting age, trauma history, and dissociation - they were divided on whether these differences represented an important distinction. We argue that the aetiological and mechanistic distinctions they support, particularly when bolstered by additional data, give reason to sustain a separation between these conditions.

## MAIN TEXT

Psychogenic non-epileptic seizures (PNES) are, after motor symptoms, the most common functional neurological symptoms(FNS)[1]. Though there is debate over whether the terms “psychogenic” or “functional” are more apt[2], nosologically, they are all part of the same diagnosis – conversion disorder – with the symptom type being no more than a specifier in both psychiatric classifications, ICD-10[3] and DSM-5[4]. But in a domain burdened with such a benighted and troubling history, whether it be movements of the womb, spirit possession, or repressed sexual trauma, some would see PNES as different – as a herald of progress: it now has a clinical-biological diagnosis[5], nascent neurobiological underpinnings[6] and finally developing evidence-backed treatments[7, 8]. Are we holding PNES back in the shadows, by keeping it in the conversion disorder category?

Historically, seizures were always a central feature of hysteria (as conversion disorder was previously known). They were the symptom of Mary Glover, the patient that re-introduced hysteria to medicine in Jorden’s *Briefe Discourse*[9]. According to Charcot, they were *the* essential symptom (*la grande hystérie*) of hysteria[10], with other symptoms only variably present; Janet and Freud saw the type of symptom in a case of hysteria as incidental - as the idea of the causative trauma in Janet, the symbolic representation of the trauma in Freud[11]. In all three, the symptom type in no way affected the diagnosis of hysteria. Today, we still see them as conceptually similar – pseudoneurological symptoms that are inconsistent with their neuropathological analogues and over which conscious control can, in theory, be reasserted. The symptoms themselves are thought not only to commonly overlap (patients with functional weakness will also have seizures, and vice versa[1, 12]), but also to shift – as seizures resolve, for example, they will be replaced by weakness (though the evidence for this is slim[1, 13]). They are overwhelmingly seen as the same patients, furthermore – typically younger women, with difficult backgrounds and substantial psychiatric co-morbidity[14, 15]. So though some studies may, opportunistically, have focussed on a single symptom, most have treated them all as a group. But as long as studies consider them as a group, how can differences be revealed? We determined to answer the question of whether PNES should remain part of the broader diagnosis of “Conversion Disorder” by a review of studies which directly compared PNES with other functional neurological symptoms.

We conducted a review of comparison studies (using PUBMED, Medline and PsycInfo; date of search 24/10/2016; search terms ("psychogenic seizures" OR "non-epileptic seizures" OR "dissociative seizures" OR “pseudoseizures”) AND ("functional neurological symptoms" OR "conversion disorder" OR "psychogenic movement disorder" OR “PMD”),

plus sought references from reviewed studies and consultation with experts; including articles or published abstracts in English that included new data): we found eight studies that directly compared patients with PNES and other neurological symptoms (see table 1), and present them chronologically.

Table 1: Studies comparing Psychogenic Nonepileptic Seizures with other Functional Neurological Symptoms.

Study	Sample (PNES/FNS)	Differences (PNES c.f. FNS)
Stone et al (2004)	20/30	Younger; more single, childless, educated, borderline personality disorder, parental divorce, CSA, life events preceding onset; less somatoform history and parental warmth
Reuber et al (2007)	30/29	More histories of all trauma and non-sexual trauma
Grimaldi et al (2010)	9/8	None
Strutt et al (2011)	22/17	More dissociative amnesia, abuse, depression symptoms; greater attribution of control of their condition to others (non-physicians)
Driver-Dunckley et al (2011)	116/56	Younger, younger age at onset; more CSA and other abuse, life events preceding onset; less educated, anxiety
Hopp et al (2011)	35/104	Younger; more female
Ludwig et al (2015)	107/40	Younger age at onset; More endorsement of stress and psychological causes, family impact, effective treatment
Demartini et al (2016)	20/20	Higher dissociation (measured on DES and CDS); less compartmentalisation (SDQ)

PNES = Psychogenic Nonepileptic Seizures; FNS = Other Functional Neurological Symptoms; CSA = Childhood Sexual Abuse; DES = Dissociative Experiences Scale; CDS = Cambridge Depersonalisation Scale; SDQ = Somatoform Dissociation Questionnaire

Stone et al. (2004)[16] conducted a prospective study on consecutive neurological inpatients diagnosed with either motor conversion (N=30) or PNES (N=20) of recent onset. Patients were administered a structured psychiatric diagnostic interview, a measure of perceived parental care, and a life events inventory, assessing preceding trauma. The authors found that patients with PNES were younger and less educated than patients with motor conversion disorder and were more likely to have a co-morbid diagnosis of borderline personality disorder, though other co-morbidities did not differ, and patients were equally employed and of similar social status. Patients with PNES were also more likely to have a perception of poor parental care and to report a previous history of sexual abuse, as well as

more life events in the 12 months before symptom onset, though fewer negative events. Based on these findings, the authors questioned the usefulness of grouping patients with PNES and motor conversion in a single diagnostic category of conversion disorder. They argued that an alternative view that gives primacy to the symptoms rather than a disorder may enable more precise research questions to be posed.

Reuber et al. (2007)[17] reviewed consecutive neurology referrals, finding 30 patients with PNES and 29 patients with other functional neurological symptoms (most commonly weakness), and identified potential etiological factors from their therapist's extended, semi-structured interview. The groups were demographically similar (PNES patients were younger, but not significantly so), and there were no differences in the domains of preceding bereavement, family factors or physical health problems, but patients with PNES had significantly higher rates than the other patients of non-sexual trauma and all trauma combined, revealing what the authors called the "etiological heterogeneity" between the groups.

A smaller study by Grimaldi et al. (2010)[18] on a series of consecutive patients (N=8 with motor conversion and N=9 with PNES, diagnosed according to clinical and video-EEG criteria) underscored the clinical and psychiatric similarities between the two conditions. In this prospective study, both patient groups had similar demographic and clinical characteristics, including depression and personality disorders, as measured by DSM-IV-based semi-structured interviews and self-ratings. The only difference (which was not statistically significant, though the small study may well have been underpowered) was a trend towards an increased prevalence of family history of epilepsy and a higher incidence of anxiety disorders among patients with PNES.

A study of 39 age- and education matched women by Strutt et al. (2011), published only as an abstract, [19] (22 with PNES, diagnosed by video EEG for PNES, and 17 with psychogenic movement disorders (PMD), diagnosed by the Fahn criteria[20]) looked at mood, dissociation and locus of control as well as demographic factors. Differences in a number of areas were probably masked by sample size, but a history of abuse (any kind) was clearly more common in PNES, as were depressive symptoms, measured by the Beck Depression Inventory, and an external locus of control attributed to non-physician others. There was a trend for the age of onset to be lower in PNES, and though a range of dissociative measures were greater in PNES, only the presence of dissociative amnesia was significantly so. The authors found these on balance to suggest a different psychological profile in PNES from PMD.

Two other studies found differences, but their authors were not persuaded these constituted an important distinction. In a retrospective chart review, Driver-Dunckley et al. (2011)[21] found significantly more frequent preceding stressors, developmental abuse, and coexisting anxiety, and lower age at assessment and less education in the PNES group. Though these confirmed many of Stone et al.'s findings, they revealed more similarities than differences between the two groups, leading the authors to suggest that these are manifestations of the same underlying psychopathology, with age and co-morbid anxiety potentially being important factors in predicting the symptomatic presentation. More recently, Hopp et al. (2012)[22] found the two patient groups had similar psychological profiles, a slight variation in age and gender (again, with younger age at assessment in the PNES group), with their main distinguishing features being the presenting signs that prompted the two different diagnostic labels, leading them to conclude that PNES and motor conversion may not be distinct entities.

A more recent study by Ludwig et al. (2015)[23] adopted a somewhat different perspective, comparing illness perceptions between patients with functional limb weakness (N=107) and PNES (N=40). The groups were similar in their demographics and co-morbid psychiatric symptoms, though the patients with PNES again were of significantly longer duration. Although both patient groups tended to reject psychological factors as relevant to their symptoms, patients with PNES did so significantly less strongly than patients with functional limb weakness. The authors felt this had implications for the conceptualisation of these symptoms as grouped together – it might reflect a greater role for trauma, or perhaps a greater awareness of episodic psychological triggers or dissociative experiences.

Finally, a study by DeMartini et al. (2016)[24] explored the phenomenology and, by inference, potential mechanisms underlying PNES and functional motor symptoms. Twenty consecutive patients with PNES were age and sex-matched with 20 patients with other motor symptoms, as well as 20 healthy controls. In comparing the patient groups they found no differences in marital or educational status, depression, anxiety, alexithymia or interoceptive sensitivity (measured by awareness of patients' own heartbeat), but they found clear differences in phenomenology as hypothesized: patients with PNES showed significantly greater levels of dissociation (in the sense of psychological detachment), measured both by the Dissociative Experiences Scale and the Cambridge Depersonalization Scale, and significantly lower levels of compartmentalization (splitting off of normally accessible motor and sensory control).

These data (five studies for a difference, three studies against, many of them small studies where the possibility of type 2 error is considerable) are not much on which to base any hypotheses, let alone conclusions, but we offer here some reasons for questioning, at least, whether the results of the majority may not have been pointing in the right direction. Firstly, the higher rate of childhood abuse in PNES hints that there may be developmental differences in adult patients with the two symptom types. Secondly, the higher rates of life events may hint at differences in causation. Thirdly, we note the huge variation in PNES as a proportion of FNS in different countries, from Turkey (90% PNES[25]) to Holland (30% PNES[26]). While such studies will always suffer from different selection biases, this hints at different socio-cultural determinants of these illnesses. Together, these suggest that there may be differences in aetiology and/or mechanism – and if so, this would be one very good reason to conceptualise these clinical presentations in terms of separate conditions[27].

Of particular interest to this question is recent evidence[28] from records of the First World War – surely the largest ever naturalistic experiment in the causation of conversion disorder. These show PNES to have been a very rare presentation (less than 1%) of 'shell-shock' among British Soldiers, in contrast with present day Britain, where PNES represents around 40% of conversion cases referred to neurologists[29]. This suggests that whatever combination of bio-psycho-social factors was present for those men was not particularly conducive to PNES, but was so to other symptoms, such as motor weakness and PMD. This would tend to support the view that childhood sexual abuse (which would have been present at no more than background rates in the conscription sample, at least) may be necessary, or at least important, in the genesis of PNES, in a way that it is not for motor weakness or PMD. And it would tend to support the view that whatever traumas were suffered in the trenches were conducive to weakness or PMD in a way they were not to PNES.

Though the preceding studies suggest that patients with PNES have higher rates of traumatic life events overall than patients with motor conversion, our research[30] (and that of others in the field[31]) has suggested that it is not merely the presence of trauma which is

of importance to the genesis of motor conversion disorder, but the type: we found that traumatic events which could be resolved by the patient subsequently becoming ill (what we termed ‘escape’ events) were particularly potent precipitants of motor conversion, whereas events in general were not. In the First World War, virtually all of the traumas would have been ‘escape’ events, as disabling illness would have led to removal from the front line, and from the threat. We have not repeated our study with PNES, so cannot say whether the same trauma-types are relevant for them, but we note that whether a symptom provides ‘escape’ from a situation will vary with the symptom and context, in any case: in the First World War an occasional convulsion may not have been considered sufficiently disabling to merit removal from the trenches. On the German side, by comparison, where there was particular medical interest in PNES, they seem to have been much more common, at least in secondary care[32]. And it is not to say that soldiers don’t develop PNES - they can and do; but not, in general, as an acute response to trauma: US veterans today, for example, have average onset of PNES in their mid-40s - long after their combat traumas[33]; and much was made of those German soldiers acquiring their seizures by contagious exposure to other seizures[28].

The sample for this ‘experiment’ was vast and, in the latter years of the war, when conscription was in place, relatively unselected – except of course, that it was exclusively male. It may be that these aetiological differences are only important for men; it may be that gender and trauma interact: that childhood sexual abuse is not only more common in female patients, for example, but affects them differently[17]. The studies we reviewed provide little evidence for gender differences, however, except in the relatively greater female preponderance of PNES in Hopp et al., and men remain strongly represented in both PNES and other functional neurological symptoms.

This is only a single piece of evidence, albeit on a very large scale, but it supports the hypothesis that the above comparative studies suggest: that PNES is a developmental disorder, where patients may dissociate in response to earlier traumas or situations which evoke their recall[34]; while motor conversion disorder, at least for many, is an adaptive response to recent life events. The association between childhood trauma and adult dissociation is well recognised, and that PNES can often be seen as dissociative in that sense is well recognised too[35], and specifically supported by the DeMartini and Strutt studies which examined it[19, 24]. A chronic state of arousal, attributed to this childhood adversity, is increasingly supported by studies of stress hormones[36] and heart rate variability[37]. The younger age at onset and presentation of the PNES cases, noted in four of the studies, also lends support to this being something carried into adulthood.

Clearly this is not going to be a clean division between PNES and other conversion symptoms. There is evidence for psychological sub-types within PNES[38], just as there is within other conversion symptoms[39]; and it seems likely there will be considerable overlap, both mechanistically and in those affected. This does not, however, provide compelling evidence against a division. Co-morbidity is extremely common in psychiatry, as the environmental and genetic causes and risk-factors rarely predispose patients to just one disorder: childhood sexual abuse, for example, appears to be a risk for virtually every psychopathology[40] – and there is no question that PNES and other conversion symptoms share a range of such risk factors. The presence of one of them may even increase the likelihood of developing the other, by a number of hypothetical routes – increasing exposure to illness models[41], increasing the risk of aetiological traumas[30], or increasing self-directed attention[42]. Just as the “to lump or to split” debate has no clear victor for the functional somatic syndromes[43], there may be no clear victor in this debate, which continues to reverberate in the literature[44-47]. But we believe there is reason to think these

differences may be important, aetiologically and mechanistically, as well as diagnostically and therapeutically, which surely makes a division worthy of consideration for any future studies or services that would consider conversion disorder as a single diagnostic entity.

PNES, PMD and all functional neurological symptoms are currently classified in the psychiatric diagnostic manuals. Like virtually all psychiatric disorders, they are more accurately described as syndromes – clusters of symptoms and signs, which are not always present individually, but are collectively – and are thus defined phenomenologically. It was not always so: for much of their history, the psychiatric manuals instead defined their disorders by the Freudian aetiologies and mechanisms that were thought to underlie them. Though they latterly eschewed this approach due to concerns about the reliability of such diagnoses, and the aetiologies on which they were based, concerns have now been raised about validity[48]. Without a defining aetiology or mechanism, symptom clusters may be an artifice of construction or chance that do not correspond to anything in nature. Who, for example, decides whether functional paroxysmal movement disorders are PMD or PNES, and on what basis[49]? If disorders remain defined by their symptoms, oedema would be the disorder, and its cardiac or renal causes concealed[50]. It is only by reference to aetiology and mechanism that progress can be made, it is argued[51], and on which basis, imperfect as those associations are, the division of PNES from the rest of conversion disorder should be made.

If PNES were to be split from the rest of conversion disorder, what would the clinical and service implications be? For those based in major neuropsychiatric centres, it may be tempting to think they would be few: the disorders may already be channelled and managed separately by virtue of their presentations to epilepsy services on the one hand, and stroke or movement disorders services on the other. But such comfortable sub-specialization is of course not worldwide, and liaison psychiatry or clinical psychology services in smaller units may well find themselves the common end-point for management of both groups, organized by the idea of them being the same disorder, adopting a single, generic psychological approach.

If our hypothesis that PNES and other conversion disorder symptoms represent distinct diagnoses is correct, then there may be some benefit from a division in those services that treat them. Our hypothesis argues for a difference in presentation – the acute response to immediate trauma, in conversion disorder, and the slow emergence of a developmental disorder in PNES[52] – that would suggest the acuity of service response needs may be different. For most conversion disorder, duration of symptoms is a clear negative prognostic factor[53], where a therapeutic intervention can produce excellent outcomes if given acutely, much less so when it is delayed[54]; in PNES, the evidence for an effect of illness duration is much less clear[55, 56], with the time-critical moment for intervention perhaps being at the time of any childhood abuse, though unfortunately this may not be disclosed until much later. In addition, there is growing evidence for differing treatments. Though much of this is still in development, as with most aspects of conversion disorder, recent research has shown encouraging responses to treatments which are specifically designed for the two symptoms, and differ not only in their treatment modality but in their mode of delivery, by psychotherapists[57, 58] or physiotherapists[59]. While a commonality of aim will doubtless be maintained - on the goals of recovery, the integration of psychiatry with neurology, the minimization of iatrogenic harm – clinicians would seem to have as great a potential stake in a differentiated service as would the researchers who have finally begun to tease these conditions apart.



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## CONTRIBUTORS

RAK and AC designed the study and act as guarantors. All authors wrote the manuscript, had full access to all of the data in the study and can take responsibility for the integrity of the data and the accuracy of the data analysis

## DATA SHARING

No additional data available.

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### What this paper adds:

Psychogenic non-epileptic seizures (PNES) have a distinct diagnosis and treatment from other functional neurological symptoms (FNS). Studies comparing PNES and FNS find differences in presenting age, trauma history and illness perception.

Studies are divided on whether these constitute an important distinction.

We argue that a hypothetical difference in aetiology and mechanism, supported by these data, would warrant PNES and other functional neurological symptoms being treated as separate disorders.

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